



10CFR50.73

LG-16-009  
February 17, 2016

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Limerick Generating Station, Unit 2  
Renewed Facility Operating License No. NPF-85  
NRC Docket No. 50-353

Subject: LER 2015-008-00, Valid Automatic Actuation of the Reactor Protection System

This Licensee Event Report (LER) addresses a valid automatic actuation of the reactor protection system (RPS) during restart from a planned outage. The automatic scram was actuated by a low reactor level condition following an unexpected opening of the main steam bypass valves during reactor heat-up.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

There are no commitments contained in this letter.

If you have any questions, please contact Robert B. Dickinson at (610) 718-3400.

Respectfully,

Original signed by

Richard W. Libra  
Site Vice President – Limerick Generating Station  
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC  
USNRC Senior Resident Inspector, LGS

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [Infocollections.Resource@nrc.gov](mailto:Infocollections.Resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE	Valid Automatic Actuation of the Reactor Protection System Due to Main Steam Bypass Valves Opening
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5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	19	2015	2015 - 008 - 00			02	17	2016	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: <i>(Check all that apply)</i>			
2	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER	
FACILITY NAME Robert B. Dickinson, Manager - Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) 610-718-3400

[illegible]

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

An unplanned valid automatic actuation of the reactor protection system (RPS) when critical occurred during a reactor restart from a planned maintenance outage. The actuation occurred due to a deficient procedure when using digital electro-hydraulic control (DEHC) main steam bypass valve (BPV) jack adjustments to increase reactor pressure. Following a demand for a pressure increase all nine BPVs opened causing a reactor high level trip of the reactor feed pump followed by a reactor low level RPS actuation. The root cause of the event was a failure to identify the risk associated with procedure changes for the DEHC installation modification and the DEHC modification team failed to adequately evaluate DEHC software changes. The corrective actions will revise the procedure change process to validate modification related procedure revisions with risk impact.

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CONTINUATION SHEET**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects.Resource@nrc.gov](mailto:infocollects.Resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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**NARRATIVE****Unit Conditions Prior to the Event**

Unit 2 was in Operational Condition (OPCON) 2 (Startup) at approximately 6 percent power conducting an increase in reactor pressure vessel (RPV) pressure from 400 psig to 500 psig. There were no structures, systems or components out of service that contributed to this event.

**Description of the Event**

On Saturday, December 19, 2015, Limerick Unit 2 was operating at 6 percent power performing a restart from a planned outage. The Reactor Operator (RO) was increasing reactor pressure vessel (RPV) pressure from 400 psig to 500 psig with the digital electro-hydraulic control (DEHC) (EHS:JJ) system using the main steam bypass valve jack (Smooth Pressure Control Method). When the sequence of steps in the operating procedure was performed, the bypass valves went full open unexpectedly. Reactor level exceeded the +54 inch high level reactor feed pump (RFP) (EHS:P) trip setpoint causing the operating 2A RFP to trip. The main turbine tripped while in standby. The high pressure coolant injection (HPCI) system and the reactor core isolation cooling (RCIC) system were already tripped due to an expected high level condition at low RPV pressure. Following the RFP trip, RPV level decreased to +3 inches which is less than the +12.5 inch low level setpoint for RPS. The low level condition caused the actuation of the RPS.

The investigation of the event identified three inappropriate actions which resulted in the development and use of a deficient procedure:

- 1) The DEHC procedures were not properly revised and validated.
- 2) Software changes made at the Factory Acceptance Test (FAT) were not properly documented and evaluated by the DEHC modification team.
- 3) The previous shift operating crew did not effectively communicate a concern they encountered while using the normal plant startup procedure (GP-2) during the previous shift.

Procedure GP-2 was not properly revised during the Unit 2 DEHC installation modification. The procedure provided two methods of DEHC pressure control during startup pressure increases. One method uses BPV jack adjustments (Smooth Pressure Control Method) and the other method uses pressure setpoint adjustments. The normal Smooth Pressure Control Method was being used during this startup at the time of the event.

The unexpected DEHC response was due to an operational difference between the Unit 1 and Unit 2 DEHC design associated with the method for BPV jack control.

A four-hour ENS notification (#51614) was completed on Saturday, December 19, 2015, at 1038 hours as required by 10CFR50.72(b)(2)(iv)(B) for an actuation of the RPS when the reactor is critical. This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A) for an automatic actuation of the RPS.

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**Analysis of the Event**

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. The high level RFP trip and low level scram occurred at low power and condensate remained capable of providing makeup coolant to the RPV.

A modification to the Unit 2 DEHC software was installed during refueling outage 2R13 in April 2015. The modification introduced a difference in the Unit 2 software to address a licensed operator request for enhanced BPV jack control.

The DEHC modification was installed on Unit 1 during refueling outage 1R15 in April 2014 and on Unit 2 during refueling outage 2R13 in April 2015.

GP-2 was identified as an impacted procedure in the Unit 2 DEHC installation modification. The procedure revision paperwork did not identify the need for procedure validation. The decision to validate only selected procedures was made without appropriate station challenge, and led to the GP-2 procedure revision errors not being identified. These latent procedural errors ultimately resulted in the Unit 2 Scram.

**Cause of the Event**

The root cause of the event was Operations Management did not identify the risk associated with procedure changes for the Unit 2 DEHC modification and did not appropriately mitigate it through procedure validations.

A contributing cause was the DEHC project team made software changes at the Factory Acceptance Test (FAT) that were not adequately documented and evaluated per the process guideline for FAT, CC-AA-107-1002.

An additional contributing cause was that issues encountered while implementing the deficient procedure, GP-2 Attachment 15, were not documented and effectively turned over to the next shift.

**Corrective Action Completed**

GP-2 was revised to appropriately address the Unit 2 DEHC design response.

A corrective action (CA) has been completed to apply performance improvement principles to the individual involved in the event concerning proper logging and turnover of evolutions that do not proceed as planned.

**Corrective Action Planned**

The corrective action to prevent recurrence (CAPR) will revise procedure AD-AA-101, Processing of Procedures and T&RMs, to ensure all modification related procedure

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revisions identified with High or Medium consequence risk factors per HU-AA-1212 are validated in accordance with AD-AA-101-F-03, Procedure/T&RM Validation Checklist. Exceptions to this validation requirement require the site Senior Leadership Team's (SLT) consent.

**Previous Similar Occurrences**

There was no previous RPS actuation due to DEHC BPV control response.

Unit 1 LER 2014-004 was submitted on May 5, 2014 and reported a scram due to a degraded EHC power supply that caused all 6 main turbine intercept valves to close.

**Component data**

System: JJ Turbine Supervisory Control System  
 Component: TBG Turbine  
 Component number: XI-031-203  
 Component name: DEHC Monitor  
 Manufacturer: 526A TYCO Electronics  
 Model number: ET2200L

System: JJ Turbine Supervisory Control System  
 Component: PL Panel  
 Component number: 20-C653  
 Component name: Turbine Console  
 Manufacturer: G080 General Electric  
 Model number: MF